RAYTHEON

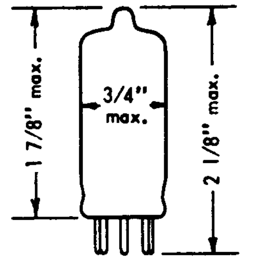
TECHNICAL INFORMATION

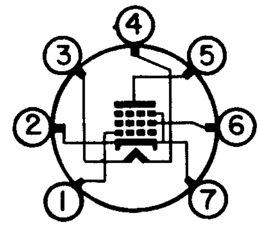
Excellence in Electronics

MINIATURE PENTODE

TYPE CK6186

The type CK6186 is a sharp cutoff pentode of miniature construction with a high gm, and low input and output capacitances. It is designed for use as an intermediate frequency amplifier or as an RF amplifier of frequencies up to 400 megacycles. Through the use of two (2) cathode leads, isolation of input and output circuits is made feasible.





BOTTOM VIEW

7BD

MECHANICAL DATA

ENVELOPE: T–5½ Glass (6–2)

BASE: Miniature Button 7–Pin, E7–1

TERMINAL CONNECTIONS:

- Pin 1 Grid #1
- Pin 2 Cathode; Internal Shield; Grid #3
- Pin 3 Heater
- Pin 4 Heater
- Pin 5 Plate
- Pin 6 Grid #2
- Pin 7 Cathode; Internal Shield; Grid #3

MECHANICAL RATINGS:

Maximum Impact Acceleration (Shock Test – Note 2)	450 G
Maximum Vibrational Acceleration (96 Hour Fatigue Test–Note 3)	2.5 G
Maximum Bulb Temperature	165 °C

MOUNTING POSITION: Any

ELECTRICAL DATA

CAUTION---To Electron Equipment Design Engineers: Special attention should be given to the temperature at which the tubes are to be operated. Reliability will be seriously impaired if maximum bulb temperature is exceeded. The life expectancy maybe reduced if conditions other than those specified for life test are imposed on the tube and will be reduced appreciably if maximum ratings are exceeded. Both Reliability and Performance will be jeopardized if filament voltage ratings are exceeded. Life and Reliability of Performance are closely related to the degree that regulation of the heater voltage is maintained at its center rated value.

RATINGS AND NORMAL OPERATION:	MIL–E–1 SYMBOL	ABSOLUTE MINIMUM	NORMAL TEST CONDITIONS (Note 5)	NORMAL OPERATION (Note 4)	ABSOLUTE MAXIMUM	MIL–E–1 UNITS
Heater Voltage (Note 6)	Ef:	5.7	6.3	6.3	6.9	V
Plate Voltage	Eb:	----	250	250	330	Vdc
Grid Voltage	Ec1:	----	0	0	----	Vdc
Grid #2 Voltage	Ec2:	----	150	150	250	Vdc
Heater Cathode Voltage	Ehk:	----	----	----	100	V
Cathode Resistance	Rk:	----	200	200	----	Ohms
Plate Dissipation	Pp:	----	----	1.75	2.5	Watts
Grid #2 Dissipation	Pg2:	----	----	0.3	0.55	Watts
Transconductance	Gm:	----	----	5000	----	µmhos
Plate Current	Ib:	----	----	7.0	----	mAdc
Grid #2 Current	Ic2:	----	----	2.0	----	mAdc
Cathode Current	Ik:	----	----	9.0	----	mAdc

ELECTRICAL DATA (Cont'd.)

CHARACTERISTICS AND QUALITY CONTROL TESTS (NOTE 1)

TEST	CONDITIONS	AQL %	MIL-E-1 SYMBOL	MIN	LAL	BOGIE	UAL	MAX	ALD	MIL-E-1 UNITS
MEASUREMENTS ACCEPTANCE TESTS, PART 1			**Combined AQL=1.0% excluding Mechanical and Inoperatives**							
Heater Current:		0.65	If:	275	----	300	----	375	----	mA
Heater Cathode Leakage:	Ehk=+100 Vdc Ehk=-100 Vdc	0.65	Ihk: Ihk:	---- ----	---- ----	---- ----	---- ----	10 10	---- ----	μAdc μAdc
Grid Current (1):		0.65	Ic1:	----	----	----	----	-0.1	----	μAdc
Plate Current (1):		0.65	Ib1:	5.2	6.3	7.0	7.7	8.8	1.5	mAdc
Screen Current:		0.65	Ic2:	1.3	1.7	2.0	2.3	2.7	0.6	mAdc
Transconductance (1):		0.65	Sm (1):	4000	4625	5000	5375	6000	850	μmhos
Continuity and Shorts: (Inoperatives)		0.4	----	----	----	----	----	----	----	----
Mechanical:	Envelope: T-5½(6-2)									
MEASUREMENTS ACCEPTANCE TESTS, PART 2										
Insulation of Electrodes:	Ef= 6.3V Eg1-all= -100 Vdc Ep-all= -300 Vdc	2.5	Rg-all: Rp-all:	100 100	---- ----	---- ----	---- ----	---- ----	---- ----	Meg. Meg.
Plate Current (2):	Rk= 0; Ec1= -4.5 Vdc	2.5	Ib (2):	5.0	----	----	----	----	----	μAdc
Plate Current (3):	Rk= 0; Ec1= -10 Vdc	2.5	Ib (3):	----	----	----	----	100	----	μAdc
Transconductance (2):	Ef= 5.7V; (Note 7)	2.5	Δ_{Ef} Sm (2):	----	----	----	----	15	----	%
Grid Emission:	Ef= 7.0; Rg1= 0.1 Meg; Preheat 5 minutes at Ef= 7.0 Vdc	2.5	Isc:	0	----	----	----	-0.2	----	μAdc
RF Noise:	Ec1= -2 Vdc; Ecal= 15.0 mVac; (Note 8)	2.5	----	----	----	----	----	3.0	----	mW
Noise and Microphonics:	Ef= 6.3 Vac; Ehk= 0; Ebb= Ecc2= 300 Vdc; Rg2= 0.6 meg; Rp= 0.01 Meg; Rk= 200; (Note 9) Ck= 1000 μf	2.5	EB:	----	----	----	----	50	----	mVac
Capacitance: Capacitance: Capacitance:	No Shield	6.5	Cg-p: Cin: Cout:	---- 5.2 1.3	---- ---- ----	---- ---- ----	---- ---- ----	0.03 7.8 2.3	---- ---- ----	μμf μμf μμf
Low Pressure Voltage Breakdown:	Pressure= 55± 5 mmHg; Voltage= 500 Vac	6.5	----	----	----	----	----	----	----	Vac
Vibration (2):	Rp= 2000 ohms; F= 25 cps; G= 2.5	6.5	Ep:	----	----	----	----	100	----	mVac
DEGRADATION RATE ACCEPTANCE TESTS										
Shock:	Hammer Angle= 30°; Ehk= 100 Vdc, Heater Positive; Rg1= 0.1 meg; Note 2	----	----	----	----	----	----	----	----	----
Fatigue:	96 Hours; G= 2.5; Fixed Frequency; F= 25 min., 60 max., Note 3	6.5	----	----	----	----	----	----	----	----
Post Shock and Fatigue Test End Points:		----	----	----	----	----	----	----	----	----
Vibration (2):		----	Ep:	----	----	----	----	450	----	mVac
Heater Cathode Leakage:	Ehk=+100 Vdc Ehk=-100 Vdc	---- ----	Ihk: Ihk:	---- ----	---- ----	---- ----	---- ----	30 30	---- ----	μAdc μAdc
Transconductance (1):		----	Sm:	3500	----	----	----	----	----	μmhos
Grid Current (1):		----	Ic1:	0	----	----	----	-0.2	----	μAdc
Glass Strain (Thermal Shock):		2.5	----	----	----	----	----	----	----	----

ELECTRICAL DATA (cont'd.)

CHARACTERISTICS AND QUALITY CONTROL TESTS (Note 1) (cont'd.)

TEST	CONDITIONS	AQL %	MIL-E-1 SYMBOL	MIN	MAX	MIL-E-1 UNITS	Allowable Defects per Characteristic 1st Sample	Combined Samples
ACCEPTANCE LIFE TESTS								
1 Hour Stability Lift Test:	Ehk= 100 Vdc, Heater Positive; Rg1= 1.0 meg; TA= room	----	----	----	----	----		
1 Hour Stability Life Test End Points:	(Typical Sample Size= 50 tubes)							
Transconductance (1) Change of individual tubes from initial:		1.0	Δ_tSm:	----	10	%		
100 Hour Survival Rate Life Test:	Ehk= 100 Vdc, heater positive; Rg1= 1.0 meg; TA= room; Min Bulb Temp.=+ 165 °C	6.5	----	----	----	----		
500 and 1000 Hours Intermittent Life Test:	Ehk= 100 Vdc; Heater Positive; Rg1= 1.0 meg; Min. Bulb Temp.= + 165 °C	----	----	----	----	----		
500 Hour Intermittent Life Test End Points:	(Typical sample size= 20 tubes 1st sample, 40 tubes 2nd sample)	----	----	----	----	----		
Inoperatives:		----	----	----	----	----	1	3
Grid Current (1):		----	Ic1:	0	−0.1	μAdc	1	3
Heater Current:		----	If:	275	325	mA	1	3
Heater Cathode Leakage:	Ehk=+ 100 Vdc Ehk= −100 Vdc	---- ----	Ihk: Ihk:	---- ----	10 10	μAdc μAdc	1	3
Transconductance (1):		----	Sm:	3750	6000	μmhos	1	3
Transconductance (2):	(Note 7)	----	Δ_{EF} Sm:	----	15	%	2	5
Electrode Insulation: (p-all) (g-all)		---- ----	Rp-all: Rg-all:	50 50	---- ----	Meg. Meg.	2	5
Transconductance (1) Average Change:		----	Avg.Δ_tSm:	----	15	%	---	---
Total Defectives:		----	----	----	----	----	4	8
1000 Hour Intermittent Life Test End Points:	(Typical Sample Size= 20 tubes 1st sample, 40 tubes 2nd sample)	----	----	----	----	----	---	---
Inoperatives:		----	----	----	----	----	2	5
Grid Current (1):		----	Ic(1):	0	−0.1	mAdc	2	5
Heater Current:		----	If:	275	325	mA	2	5
Transconductance (1):		----	Sm:	3500	6000	μmhos	2	5
Heater Cathode Leakage:	Ehk=+ 100 Vdc Ehk= −100 Vdc	---- ----	Ihk: Ihk:	---- ----	10 10	μAdc μAdc	2	5

Note 1: Characteristics, Quality Control Test Procedures, and Inspection Levels are made according to the appropriate paragraphs of MIL-E-1 "Inspection Instructions for Electron Tubes" and MIL-STD-105A.

Note 2: Test Conditions and Acceptance Criteria per Shock Test Procedures of MIL-E-1 basic specifications.

Note 3: Test Conditions and Acceptance Criteria per Fatigue Test Procedures of MIL-E-1 basic specifications.

ELECTRICAL DATA (Cont'd.)

NOTES (cont'd.)

Note 4: These normal values represent conditions at which control of reliability may be expected.

Note 5: These normal test conditions are used for all characteristic tests unless otherwise stated under the individual test item.

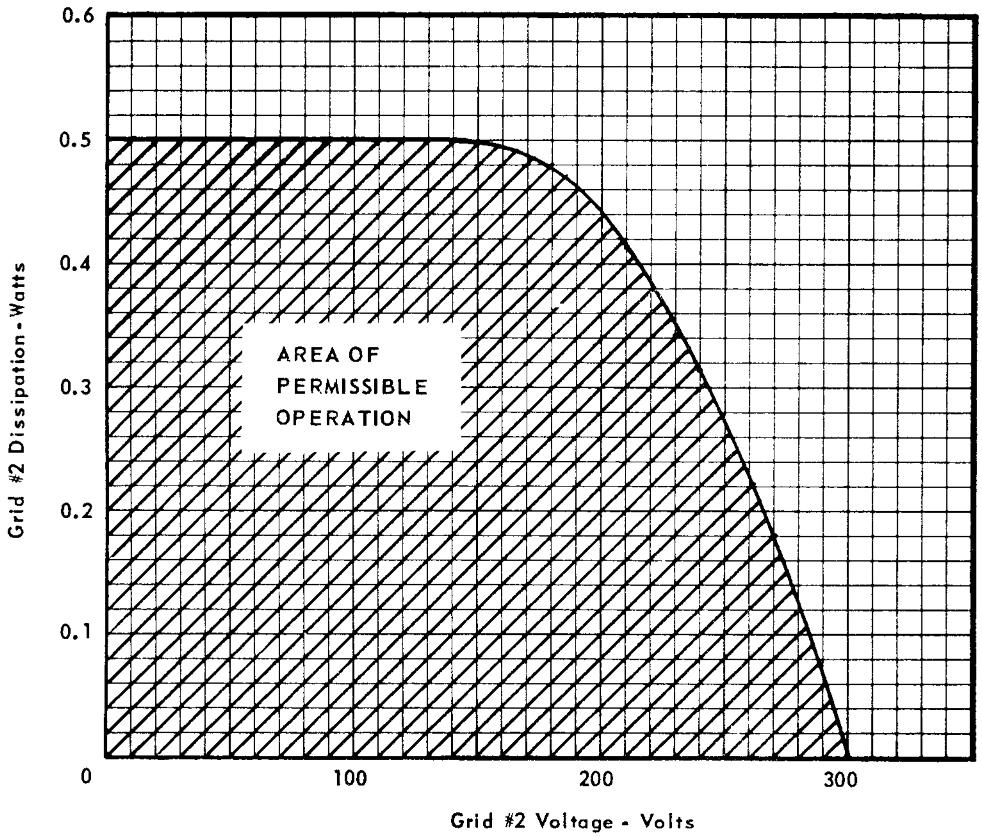
Note 6: For most applications the performance will not be adversely affected by ± 10% heater voltage variation, but when the application can provide a closer control of heater voltage, an improvement in reliability will be realized.

Note 7: Change of transconductance for individual tubes from that value measured at Ef= 6.3V to that value measured at Ef= 5.7V.

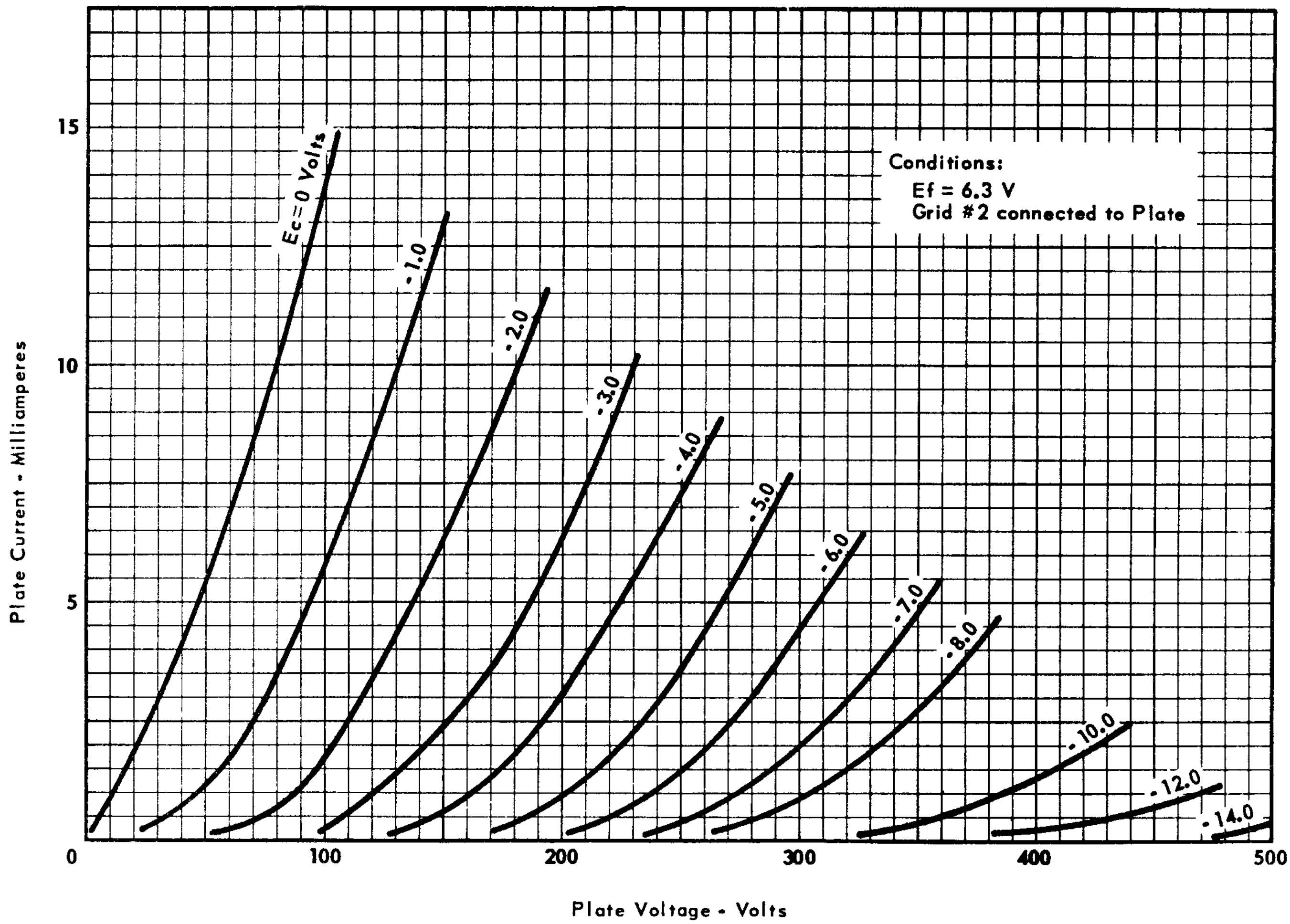
Note 8: The output indicator shall be a VU meter. The three (3) milliwatt point shall be determined as a meter deflection of 25% the calibration point.

Note 9: The cathode resistor shall be shunted with a capacitive reactance not exceeding three (3) ohms at 60 cycles.

GRID #2 RATING CURVE



AVERAGE PLATE CHARACTERISTICS
(Triode Connected)



AVERAGE PLATE CHARACTERISTICS

